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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,416	12/11/2003	Patrick Reichenauer	MM4404DIV	1160

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EXAMINER
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AWAI, ALEXANDRA F

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 07/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/734,416	<b>Applicant(s)</b> REICHENAUER, PATRICK	
	<b>Examiner</b> Alexandra Awai	<b>Art Unit</b> 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 6/13/2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 6/13/2006 have been fully considered but they are not persuasive. Those objections and rejections that have been overcome by amendment are omitted from the present Office Action, and are to be considered withdrawn. The arguments regarding the previous rejections under 35 U.S.C. 112 are considered in the rejections set forth in this Office Action.

Applicant's arguments with regard to the primary references, Ahmed et al. and Schoenig et al. appear to be predominantly directed to the suggestion that they disclose Applicant's invention except for the step of the calibration of the detector by the simulation method.

Applicant asserts that the primary references fail to teach "how to simulate the response of the radiation detector" (Remarks, p. 13). Examiner clarifies that the previous examiner's admission that the primary references fail to teach the step of the calibration of the detector by the simulation method is fully inclusive of the failure to teach how to stimulate the response of the radiation detector. That is, the primary references fail to teach how to simulate the response of the radiation detector, and therefore they also fail to teach how to calibrate the detector by the simulation method. This fact is demonstrated by the absence of any supported statement in the previous Office Action that either of the primary references teaches the recited step.

Accordingly, the previous examiner never assumed that it must be inherent for the calibration to require simulating the response of a radiation detector. Examiner only asserts that the detectors in either of the primary references are inherently calibrated prior to their use. Examiner goes on

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to state that “[n]o specifics are provided on how the detector calibration are performed” (p. 6) – i.e., there is no assumption as to the requirements of the calibration step. Applicant fails to provide any evidence or arguments contesting the previous examiner’s assertion that the primary references encompass the claimed invention except with regard to the simulation of the detector response.

Bronson et al. is only provided to cure this deficiency, that is, to provide a compatible teaching regarding calibrating detectors by simulating detector response. Bronson et al. disclose a calibration method for radiation spectroscopy *comprising mathematical simulations*, and teach numerous useful insights with regard to known calibration, modeling and radiation detector systems in general. Although Bronson et al. do not phrase the teaching of simulating the response of the radiation detector precisely as Applicant does, the skilled artisan is fully capable of interpreting the written disclosures as disclosing common information. For instance, in the Presentation of the Invention, Applicant states:

“In this process, the preliminary calibration of the measurement system is eliminated and is replaced by a simulation of the response of the measurement system detector, in other words, the count made by this measurement system” (p. 2, lines 13-17),

while in their Background Art section, Bronson et al. state:

“It has also been proposed that the calibration measurement be replaced with mathematical simulation such as using Monte Carlo techniques” (col. 3, lines 1-4).

Given that the use of Monte Carlo techniques have been used in calibration processes – the calibration by definition including the count made by the measurement system – since at least the 1980’s as discussed by Bronson et al., it can hardly be said that Bronson et al. fails to teach such.

As related by Applicant, “[t]he simulation of the response of detector D is purely digital and is based on the software that is stored in the memory 26 and in which a number of items are

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input” (p. 6, lines 13-16), including radioactive emission spectra, detection characteristics, operating characteristics and a mathematical motor. “The mathematical motor makes a Gaussian distribution of the energy as a function of the resolution. The result is a simulated spectrum for each isotope *i* considered. A total spectrum is obtained by summation. Therefore, the response of the detector is simulated.” (p. 7, lines 19-25). “The generation of representative radiation counts is simulated using a Monte Carlo method using random numbers” (p. 6, lines 28-30). These passages demonstrate that the “simulation of the response of detector” *is equivalent to* using a Monte Carlo method to perform calibrations. Since such Monte Carlo methods are widespread as evidenced by Bronson et al., it is not necessary for Bronson et al. to explicitly teach the steps required to perform them. It is sufficient for Bronson et al. to explicitly disclose that such methods are known in the art.

The step of correcting the simulated response using the detector response is described by the following passage:

“If the count obtained by simulation is too high, or if it is not high enough, the fictitious mass is corrected until the count obtained is the same as the count obtained with the actually inspected pellet ... When the count obtained is equivalent, in other words when the correct fictitious mass is obtained, this value will be saved and will be used to calculate all other points on regression straight lines” (p. 8, lines 1-12).

Bronson et al. state that “Debertin and Grosswendt ... also use Monte Carlo methods with some success, but rely on a known radioactive source for the primary calibration, and only use the mathematical computation for some correction factors” (col. 3, lines 6-11). This statement further demonstrates the actual state of the art, which is that skilled artisans are well aware of the modes and advantages of using simulated calibrations, and correcting those calibrations.

Therefore, although the method claimed by Bronson et al. includes providing a calibration source

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at each of the efficiency point locations, rather than using an entire arbitrary rod or pellet as presently disclosed, the *teachings* gleaned from Bronson et al. as a whole fully enable the skilled artisan to simulate the detector calibration response to an exemplary object. Indeed, it is an object of the method taught by Bronson et al. to be applicable to a wide variety of sample shapes (col. 3, lines 41-43).

As to the issue of how the methods taught by the primary sources may be combined with the simulated calibration method taught by Bronson et al., the modification would consist of replacing the initial measured calibration that, as Applicant admits, is known, with the simulated calibration step enabled by teachings from Bronson et al. The calibration technique taught by Bronson et al. “can be applied to the quantitative analysis of a spectrum of radioactivity taken from a wide variety of *in situ* or laboratory samples” (see Abstract). The Background Art section of this reference discusses how radiation detector systems, and gamma spectroscopy systems in particular (which commonly use NaI(Tl) detectors, just as the present invention and primary references do) have been calibrated in the past using numerous samples, but that it is advantageous to replace calibration measurements with mathematical simulations. Given the level of skill in the art, a skilled artisan would readily appreciate how to use numerical techniques in place of actual measurements while practicing the methods disclosed by the primary references.

### *Status of the Claims*

2. Amended claim 16 and previously present claims 17-24 have been examined.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 16-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 16 recites “for reproducing the radiation emitted.” while the specification states that “[t]he simulation of the response of detector D is purely digital” (p. 6). Note that “the process” must be the same as the “Process to simulate the response of a radiation detector.” It is therefore unclear how a skilled artisan would be able to use a computer to carry out the process for producing, much less *reproducing* radiation emitted.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 16 and 21-24 rejected under 35 U.S.C. 102(b) as being anticipated by Bronson et al.

Bronson et al. disclose simulated calibration for radiation spectroscopy. In particular, the invention is an improvement over measured calibration processes for gamma spectroscopy systems (claim 24; col. 1, lines 25+). The method allows either radioactive standard point sources to be used, or mathematical “point sources” such as by Monte Carlo techniques (col. 5, lines 1-3). The Disclosure of Invention describes the following summarized method of calibrating and using a radiation detector to measure radioactivity of a radioactive object:

- characterizing the detector (claim 22),
- providing a calibration source,
- providing at least one detector characterization equation describing absolute efficiency as a function of energy, angle and distance from the detector (claim 22),
- comparing shape of said radioactive object to a variety of models with standard sample shapes, selecting a model with shape similar to said shape of said radioactive object,
  - inputting to said model all necessary parameters to describe the composition and location of at least one radioactive source region within said model (claim 16),
  - inputting into said model location and composition all attenuating materials and inputting into said model detector location and its orientation with respect to at least one radioactive source region (claim 21),
- using computed final efficiencies to efficiency calibrate the detector, and
- using the calibrated detector to measure radioactivity of the radioactive object.

It is inherent to the operation of such a method that the step of “inputting to said model all necessary parameters to describe the composition and location of at least one radioactive source region within said model” requires determining (or choosing) the elements representative of the object and using known (memorized) radioactive emission spectra within a digital database (claim 16). Similarly, as demonstrated by Applicant (specification, p. 1), regression straight lines are an essential and inherent component in the calculations associated with calibrations of detectors (claim 23). As to limitations which are considered to be inherent in a reference, note the case law of *In re Ludtke*, 169 USPQ 563, *In re Swinehart*, 168 USPQ 226, *In re Fitzgerald*, 205 USPQ 594, *In re Best et al.*, 189 USPQ, and *In re Brown*, 173 USPQ 685, 688.



***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bronson et al. and admissions within the specification.

Bronson et al. disclose that there are known methods including the following steps: 1) analyzing the composition of a radioactive sample and 2) calibrating the detector using the composition analysis (col. 1, lines 25-39). Moreover, the calibration technique taught by Bronson et al. “can be applied to the quantitative analysis of a spectrum of radioactivity taken from a wide variety of *in situ* or laboratory samples” (see Abstract), which may obviously include stacks of pellets of nuclear fuel. Indeed, Applicant admits that it is known to inspect fuel rods (specification, p. 1).

As mentioned previously, Bronson et al. state that “Debertin and Grosswendt ... also use Monte Carlo methods with some success, but rely on a known radioactive source for the primary calibration, and only use the mathematical computation for some correction factors” (col. 3, lines 6-11). Given that claim 17 fails to provide any specifics as to how the simulated response is corrected “using the response of the detector obtained during calibration,” the disclosure that mathematical computation is used for some correction factors renders the step obvious. Additionally, the discussion of Debertin and Grosswendt referenced above clearly demonstrates steps 1 and 2. Although Bronson et al. only mentions sodium iodide detectors (scintillators)

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specifically, annular scintillator detectors are also well known in the art, as evidenced by page 1 of the specification.

It would have been obvious to employ a simulated calibration technique as taught by Bronson et al. instead of one based on measurements, in order to analyze nuclear fuel elements according to disclosures by Bronson et al. as related above (i.e., using steps 1 and 2). The motivation to substitute the calibration technique would be to avoid the disadvantages of measured calibration techniques, which are expensive and time consuming (col. 1, lines 40-54).

### *Conclusion*

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexandra Awai whose telephone number is (571) 272-3079.

The examiner can normally be reached on 9:30-6:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA  
July 12, 2006

  
JACK KEITH  
SUPERVISORY PATENT EXAMINER